UNDERWATER BRIDGE INSPECTION REPORT

STRUCTURE NO. 93477

CR 71

OVER THE

CROSS RIVER

DISTRICT 1 - KOOCHICHING COUNTY

PREPARED FOR THE

MINNESOTA DEPARTMENT OF TRANSPORTATION

BY

COLLINS ENGINEERS, INC.

JOB NO. 3512 (4A)

MINNESOTA DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

REPORT SUMMARY:

The substructure units inspected below water at Bridge No. 93477, the East and West Abutments, were found to be generally in good condition below water. Above water, the previously noted amount of minor checking and areas of heavier deterioration along the upper portion of the piles and planking of the wingwalls has increased. The channel appeared to be in stable condition with no evidence of significant scour observed or significant changes since the last inspection.

INSPECTION FINDINGS:

(A) The wingwall planking at the East and West Abutments was found to be failing and shifted backward over the upper 3 feet of the wall. This condition appears related to erosion of material behind the wingwalls due to roadway runoff. Random wingwall piles exhibited a loss of section ranging from 50 to 75 percent in the upper 3 feet of the pile.

(B) The pile cap at both abutments was rotating backward and only bearing on between 10 and 25 percent of the top of each pile.

(C) Random checking and splitting, up to 1/4 inch wide, was observed on all of the piles.

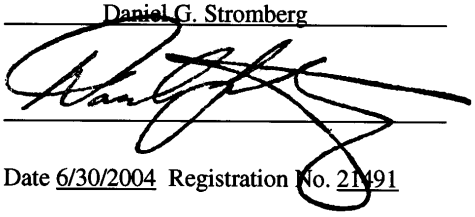
RECOMMENDATIONS:

(A) Repair measures should be implemented to restore pile bearing and stabilize the backwall planking and pile cap at both abutments.

(B) Reinspect the submerged substructure units at the normal maximum recommended (NBIS) interval of five (5) years.

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

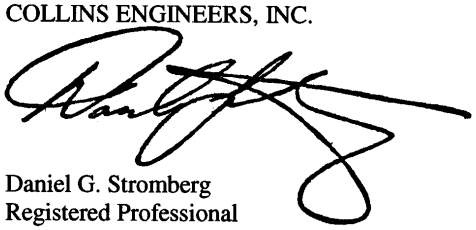
Daniel G. Stromberg



Date 6/30/2004 Registration No. 21491

Respectfully submitted,

COLLINS ENGINEERS, INC.



Daniel G. Stromberg
Registered Professional
Engineer, State of Minnesota

MINNESOTA DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

1. BRIDGE DATA

Bridge Number: 93477

Feature Crossed: The Cross River

Feature Carried: CR No. 71

Location: District 1 - Koochiching County

Bridge Description: The bridge superstructure consists of a timber deck supported by multiple timber stringers. The superstructure is supported by two timber abutments, with five timber piles per abutment. The abutments are labeled as the East Abutment and West Abutment.

2. INSPECTION DATA

Professional Engineer Diver: Daniel G. Stromberg
State of Minnesota, P.E., No. 21491

Dive Team: Michelle D. Koerbel, Matthew J. Lengyel

Date: August 24, 2002

Weather Conditions: Sunny, ± 77^{o} F

Underwater Visibility: ± 2.0 Feet

Waterway Velocity: ± 1.0 f.p.s.

3. SUBSTRUCTURE INSPECTION DATA

Substructure Inspected: East and West Abutments.

General Shape: Each abutment consists of a single row of five timber piles with timber cap and timber backwall planking, and two skewed timber pile and plank wingwalls.

Maximum Water Depth at Substructure Inspected: Approximately 2.0 feet.

4. WATERLINE DATUM

Water Level Reference: The top of the cap at south end of East Abutment.

Water Surface: The waterline was approximately 6.0 feet below reference.
Assumed Waterline Elevation = 94.0.

5. NBIS CODING INFORMATION (Minnesota specific codes are used for 92B and 113)

Item 60: Substructure: Code 6

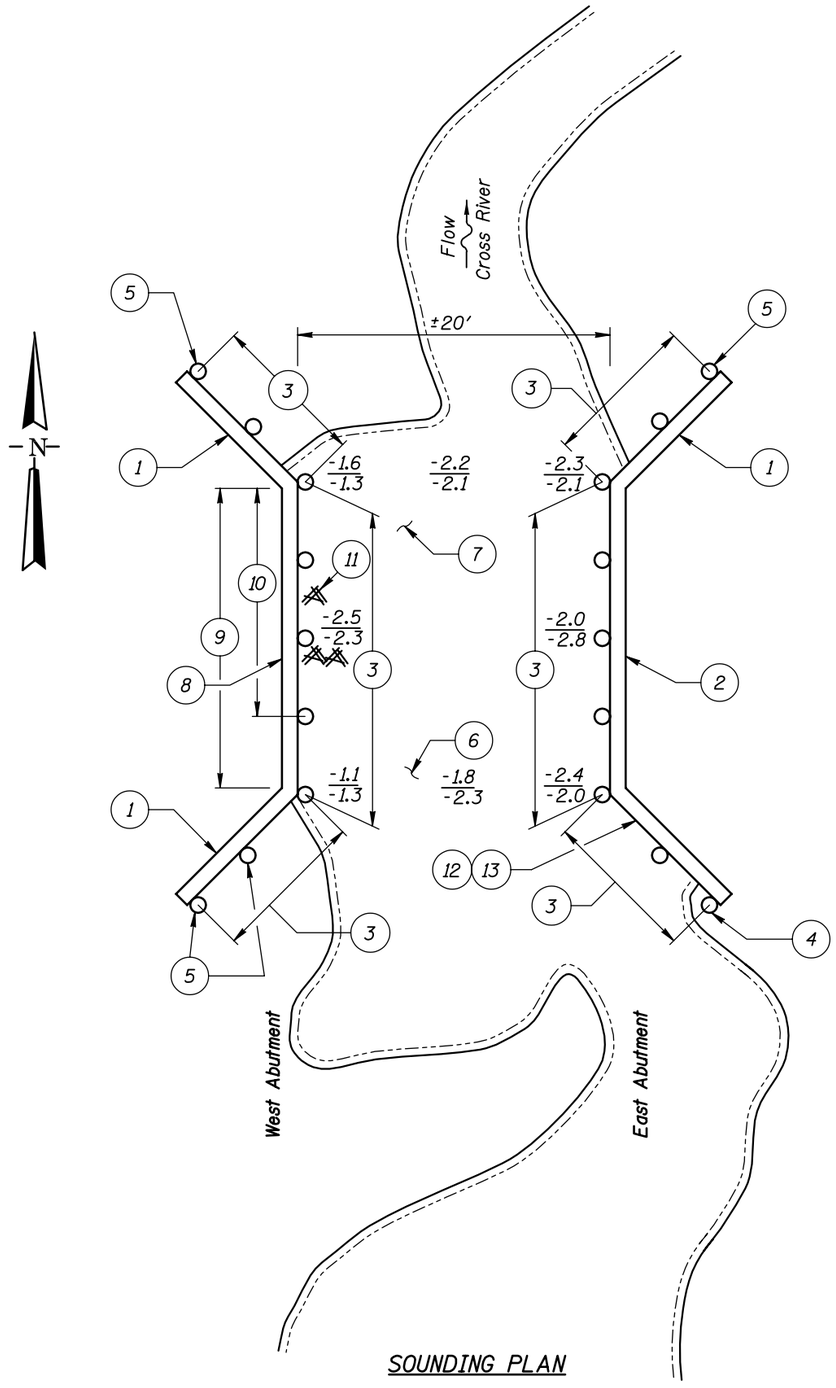
Item 61: Channel and Channel Protection: Code 8

Item 92B: Underwater Inspection: Code B/08/02

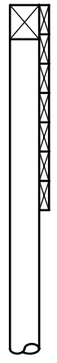
Item 113: Scour Critical Bridges: Code I/95

Bridge is scour critical because abutment or pier foundation is rated as unstable due to observed scour at bridge site.

_____ Yes __X__ No



SOUNDING PLAN



TYPICAL SECTION
EAST ABUTMENT
(West Abutment Opp. Hand)

GENERAL NOTES:

1. The East and West Abutments were inspected underwater.
2. At the time of inspection on August 24, 2002, the waterline was located approximately 6.0 feet below the top of cap at the upstream end of East Abutment. Design plans were not available, therefore a reference elevation of 100.0 was assumed. Based on the assumed reference the waterline elevation was 94.0
3. Soundings indicate the water depth at the time of inspection and are measured in feet.
4. Soundings were taken parallel to the bridge at the span midpoint, and along each abutment.

INSPECTION NOTES:

(1) Top 2 to 3 feet of wingwall was failing and shifted backward with displaced planking.

(2) Abutment cap was observed to be rotating backward (away from channel), and the upper 3 feet of the backwall is also moving backwards approximately 6 to 9 inches. Cap is only bearing on 10 to 25 percent of the top of each pile.

(3) Random checking and cracking up to 1/4 inch wide was observed on all piles above the waterline.

(4) Pile is deteriorated over the top 3 feet, with up to 75 percent loss of section.

(5) Pile is deteriorated over the top 3 feet, with up to 50 percent loss of section.

(6) The channel bottom consisted of sandy gravel with 6 inches of probe rod penetration.

(7) Channel bottom consisted of silty sand of up to 1 foot of probe rod penetration.

(8) The upper 3 feet of the backwall is moving 3 to 4 inches backwards, away from the channel, and the cap is bearing on 50 percent of the top of each pile.

(9) Random 1/2 to 1 inch differential movement between the backwall planking was observed at the West Abutment.

(10) A 1 inch wide gap with 1 inch of penetration and fill escaping was observed, and was located approximately 3 inches below the waterline.

(11) Timber drift with branches up to 6 inches in diameter was observed at the West Abutment.

(12) At 2-1/2 feet above the waterline the planking was spliced outward with 1-1/2 inch wide gap between the planking. A 1 foot deep void was located behind the gap and extended from the gap to the mudline.

(13) A 2 feet long by 6 inch high area of undermining was located below the 1-1/2 inch wide gap at the mudline.

Legend

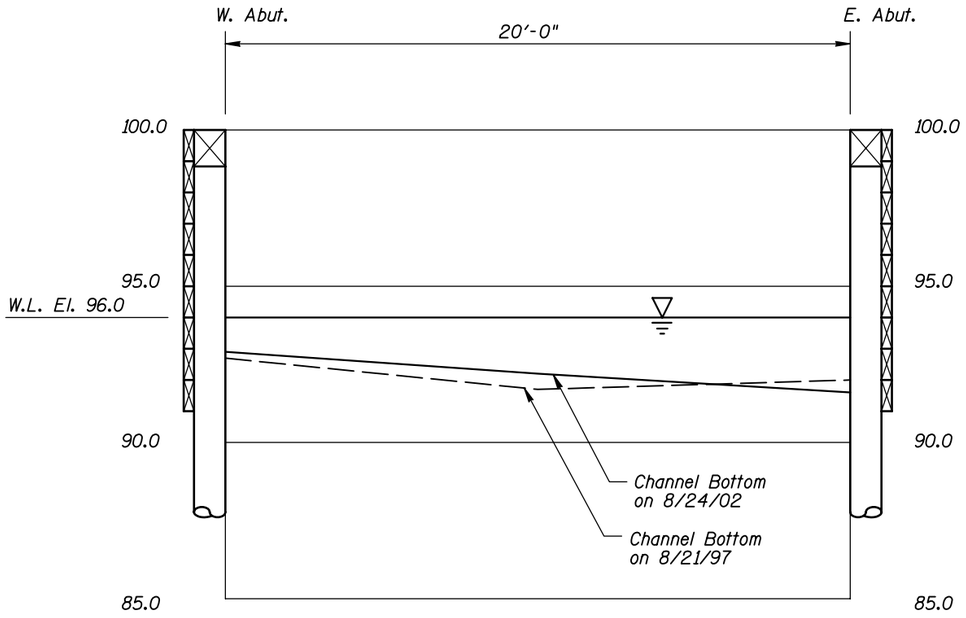
-2.0	Sounding Depth from Waterline (8/24/02)
-2.8	Sounding Depth from Waterline (8/21/97)
○	Timber Pile
	Timber Debris

MINNESOTA
DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

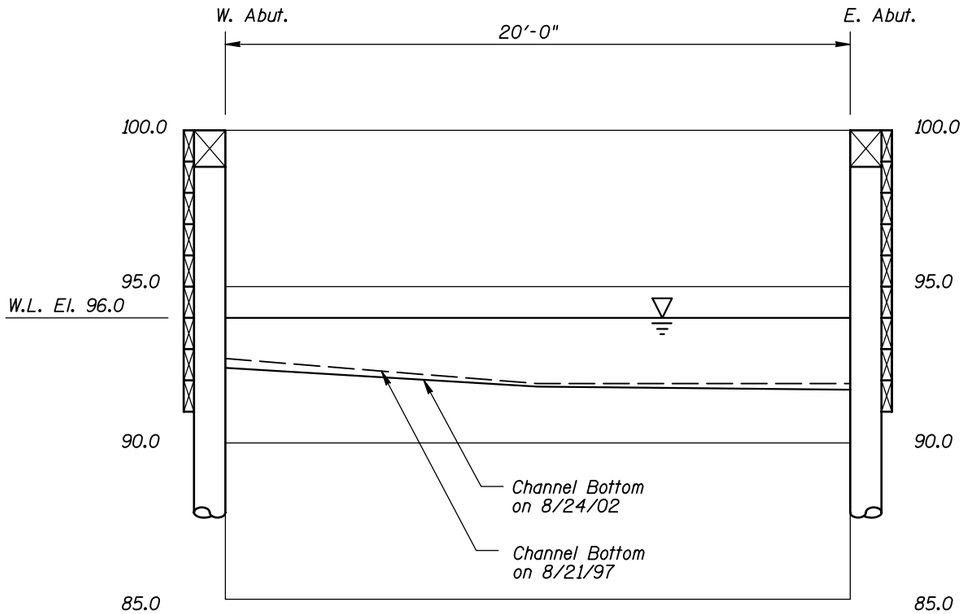
STRUCTURE NO. 93477
OVER THE CROSS RIVER
DISTRICT 1, KOOCHICHING COUNTY

INSPECTION AND SOUNDING PLAN

Drawn By: PRH	**COLLINS ENGINEERS, INC.**	Date: AUG. 2002
Checked By: MDK	300 W. WASHINGTON, STE. 600 CHICAGO, ILLINOIS 60606 (312) 704-9300	Scale: NTS
Code: 35I2004A		Figure No.: 1



UPSTREAM FASCIA PROFILE



DOWNSTREAM FASCIA PROFILE

Note:

Refer to Figure 1 for General Notes.

MINNESOTA
DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

STRUCTURE NO. 93477
OVER THE CROSS RIVER
DISTRICT I, KOOCHICHING COUNTY

UPSTREAM AND DOWNSTREAM FASCIA PROFILES

Drawn By: PRH	COLLINS ENGINEERS, INC.	Date: AUG. 2002
Checked By: MDK	300 W. WASHINGTON, STE. 600 CHICAGO, ILLINOIS 60606 (312) 704-9300	Scale: 1"=5'
Code: 3125004A		Figure No.: 2

Photograph 1. Overall View of the West Abutment, Looking Northwest.

Photograph 2. Overall View of the East Abutment, Looking Northeast.

Photograph 3. View of North Wingwall on the West Abutment, Looking Southwest.

Photograph 4. View of South Wingwall on the West Abutment, Looking Southwest.

Photograph 5. View of North Wingwall on the East Abutment, Looking East.

Photograph 6. View of South Wingwall on the East Abutment, Looking Northeast.

Photograph 7. View of the Top of the East Abutment, Looking Northeast.

Photograph 8. View of the Top of the West Abutment, Looking North.

Photograph 9. View of Gap in the South Wingwall on the East Abutment, Looking Northwest.

MINNESOTA DEPARTMENT OF TRANSPORTATION
OFFICE OF BRIDGES AND STRUCTURES
DAILY DIVING REPORT

INSPECTORS: Collins Engineers, Inc. DATE: August 24, 2002

ON-SITE TEAM LEADER: Daniel G. Stromberg, P.E.

BRIDGE NO: 93477 WEATHER: Sunny, ± 77° F

WATERWAY CROSSED: Cross River

DIVING OPERATION: X SCUBA SURFACE SUPPLIED AIR

X OTHER Wading due to low water levels

PERSONNEL: Michelle D. Koerbel, Matthew J. Lengyel

EQUIPMENT: U/W Light, Scraper, Lead Line, Sounding Pole, Probe Rod, Camera

TIME IN WATER: 4:10 P.M.

TIME OUT OF WATER: 4:40 P.M.

WATERWAY DATA: VELOCITY ± 1.0 f.p.s.

VISIBILITY ± 2.0 feet

DEPTH 2.5 feet maximum at the East Abutment

ELEMENTS INSPECTED: East and West Abutments

REMARKS: Overall, the timber piling and wall planking of the abutment were sound and in good to satisfactory condition with only random minor checking below water. Above water there was some heavy deterioration at the top of each pile at the ends of each abutment. Both abutments exhibited displacement of the piling and wall planking, especially at the upper 3 feet of each abutment backwall (6 to 9 inches backward at the East Abutment and 3 to 4 inches backward at the West Abutment). Because of this movement, there was reduced bearing contact between the piles and the pile caps (25% remaining bearing at the East Abutment and 50% remaining at the West Abutment).

FURTHER ACTION NEEDED: ___X___ YES _____ NO

Repair measures should be implemented to restore pile bearing and stabilize the backwall planking and pile cap at both abutments.

Reinspect the submerged substructure units at the normal maximum recommended (NBIS) interval of five (5) years.

MINNESOTA DEPARTMENT OF TRANSPORTATION
OFFICE OF BRIDGES AND STRUCTURES

UNDERWATER INSPECTION CONDITION RATING FORM

BRIDGE NO. 93477
INSPECTORS Collins Engineers, Inc.
ON-SITE TEAM LEADER Daniel G, Stromberg, P.E. 21491
WATERWAY CROSSED The Cross River

INSPECTION DATE August 24, 2002

NOTE: USE ALL APPLICABLE CONDITION DEFINITIONS AS DEFINED IN THE MINNESOTA RECORDING AND CODING GUIDE INCLUDING GENERAL, SUBSTRUCTURE, CHANNEL AND PROTECTION, AND CULVERTS AND WALL DEFINITIONS TO COMPLETE THIS FORM.

CONDITION RATING

			SUBSTRUCTURE						CHANNEL					GENERAL					
UNIT REFERENCE NO.		MAXIMUM DEPTH OF WATER	PILING	COLUMNS, SHAFTS, OR FACES*	FOOTINGS	DISPLACEMENT	BACKWALL PLANKING	OVERALL SUBSTRUCTURE CONDITION CODE*	SCOUR	EMBANKMENT EROSION	EMBANKMENT PROTECTION	OTHER (DRIFT/DEBRIS)	OVERALL CHANNEL & PROTECTION CONDITION	CONCRETE	STEEL	TIMBER	LOSS OF SECTION	PREVIOUS REPAIR OR MAINTENANCE	OTHER (PILE BEARING)
	UNIT DESCRIPTION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	East Abutment	±2.4’	7	7	N	6	5	6	8	N	N	7	8	N	N	7	7	N	6
	West Abutment	±2.5’	7	7	N	6	5	6	8	N	N	9	8	N	N	7	7	N	5

*UNDERWATER PORTION ONLY

REMARKS: Overall, the timber piling and wall planking of the abutment were sound and in good to satisfactory condition with only random minor checking below water. Above water there was some heavy deterioration at the top of each pile at the ends of each abutment. Both abutments exhibited displacement of the piling and wall planking, especially at the upper 3 feet of each abutment backwall (6 to 9 inches backward at the East Abutment and 3 to 4 inches backward at the West Abutment). Because of this movement, there was reduced bearing contact between the piles and the pile caps (25% remaining bearing at the East Abutment and 50% remaining at the West Abutment).

NOTES: ATTACH SKETCHES AS NEEDED, IDENTIFY REMARK BY REFERRING TO UNIT REFERENCE NO. AND REMARK NO.
USE GENERAL SECTION TO IDENTIFY OVERALL PRESENCE OF SPALLS, CRACKS, CORROSION, ETC.